

ABSTRACT

A method for electrochemical synthesis of ammonia gas comprising providing an electrolyte between an anode and a cathode, providing hydrogen gas to the anode, oxidizing negatively charged nitrogen-containing species present in the electrolyte at the anode to form an adsorbed nitrogen species, and reacting the hydrogen with the adsorbed nitrogen species to form ammonia. Preferably, the hydrogen gas is provided to the anode by passing the hydrogen gas through a porous anode substrate. It is also preferred to produce the negatively charged nitrogen-containing species in the electrolyte by reducing nitrogen gas at the cathode. However, the negatively charged nitrogen-containing species may also be provided by supplying a nitrogen-containing salt, such as lithium nitride, into the molten salt electrolyte mixture in a sufficient amount to provide some or all of the nitrogen consumed in the production of ammonia.